Species of Concern

California is the most biologically diverse state in the contiguous United States and one of the fastest growing in population. As a result, threats to the continued existence of native species and the natural communities on which they rely are also increasing. Species of Concern as used in this chapter is a general term that may include formally listed plants and animals as well as those that require additional management attention to prevent formal listing. See the online documents California's Plants and Animals and Fish and Game Species of Concern (California Department of Fish and Game (DFG), 2000a and 2000b).

The California Department of Fish and Game annually documents the status of rare, threatened and endangered species and identifies threats to theses species. For 2000, habitat modification, non-native species, and water withdrawals are frequently mentioned threats (DFG, 2000). This information was summarized in detail in the DFG 1991 annual report. When categories of threat are ranked by DFG, urbanization of the state's wildlands poses the greatest

Urbanization of the state's wildlands poses the greatest threat to the continued existence of the endangered flora and fauna.

threat to the continued existence of the endangered flora and fauna (DFG, 1991). Other significant threats to plants include impacts associated with livestock grazing, off-road vehicles, conversion of native habitats to agriculture, competition with non-native plants, and road construction/maintenance. Impacts from logging were ranked 17th in the 21-category list of threats to State-listed plants (DFG, 1991). Other significant threats to animals include impacts associated with water projects, introduced predators and competitors, conversion of native habitats to agriculture, livestock grazing, environmental contaminants, and flood control activities. Impacts from logging were ranked 11th in the 18-category list of threats to State-listed animal species (DFG, 1991).

*California jewelflower (*Caulanthus californicus*), federally endangered. Photo courtesy of Dean William Taylor.*

Over the last 100 years, loss of natural communities such as riparian woodlands, wetlands, native grasslands, and coastal sage exceed 90 percent. In 1991, a preliminary assessment of species status and protection needs conducted by DFG estimated that an additional 60 animals and 600 plants might meet the official listing criteria of the State's Endangered Species Act (ESA). At that time, California also had more species under consideration for federal listing (957) than any other state (DFG, 1991).

State and federal formal list of rare, threatened, or endangered species: The formal list of State and/or federal endangered, threatened, or rare plants and animals of California are pursuant to the Native Plant Protection Act of 1977, California ESA of 1984, and federal ESA of 1973. See the online documents State and Federally Listed Endangered, Threatened, and Rare Plants of California and State and Federally Listed Endangered and Threatened Animals of California (DFG, 2002a and 2002b). There are separate State and federal lists where each listed species is classified as rare (State listed plants only), threatened, or endangered. The California Fish and Game Commission (State list) or the U.S. Secretary of the Interior or the U.S. Secretary of Commerce (federal list) are the governing bodies that place species on the appropriate list. Species are submitted for the State list by individuals, organizations, or DFG to the California Fish and Game Commission requesting that a plant or animal be added to, deleted from, or changed in status. A similar process is followed at the federal level with the U.S. Fish and Wildlife Service and National Marine Fisheries Service submitting recommendations to their respective federal departments. (See USFWS listed species and NMFS listed species). The factors that contribute to determining the need to list a species include rate of habitat loss, competition with or predation by other species, disease, overexploitation by collectors, or other natural occurrences or human-related activities. See California's Endangered Species Act Listing Process (DFG, 2000c). For the purpose of this report, unless otherwise denoted, the formal listing of animal species refers to those that are State listed as threatened or endangered and/or federally listed as threatened or endangered. Plant species formally listed refers to those that are State listed as rare, threatened, endangered, and/or federally listed as threatened or endangered (no rare listing category exists at the federal level). No information is summarized for candidate or proposed species.

Findings on species of concern: formal listing trends

Taxa listed in Table 1 are composed of species, subspecies, distinct populations, or evolutionary significant units that appear on either the federal or State ESA or are listed under both acts (DFG, 2001). The number of listings continues to rise, increasing from 195 taxa in 1987 to 389 in 2000 (see Table 1, Figures 1 and 2).

*Western snowy plover (*Charadrius alexandrinus nivosus*), federally threatened. Photo courtesy of Lorraine Elrod, California Academy of Sciences.*

Table 1. Cumulative number of formally listed* taxa**, 1987 to 2000

Year	Plants	Gastropods	Crustaceans	Insects	Fish	Amphibians	Reptiles	Birds	Mammals	Total
1987	118	-	-	-	18	8	9	20	22	195
1990	215	1	2	12	18	8	9	26	25	316
1993	218	1	2	13	18	8	13	28	26	327
2000	254	2	8	20	26	10	13	28	28	389

Official listed animal species refers to state listed as threatened or endangered (T&E), federally listed as T&E or on both the state and federal list as T&E. Official listed plant species refers to those that are state listed as threatened, endangered, or rare (TE&R), federally listed as T&E, or both state and federally listed as T&E.

**includes species, subspecies, distinct populations, evolutionary significant units (ESU)*

Source: DFG, 2001

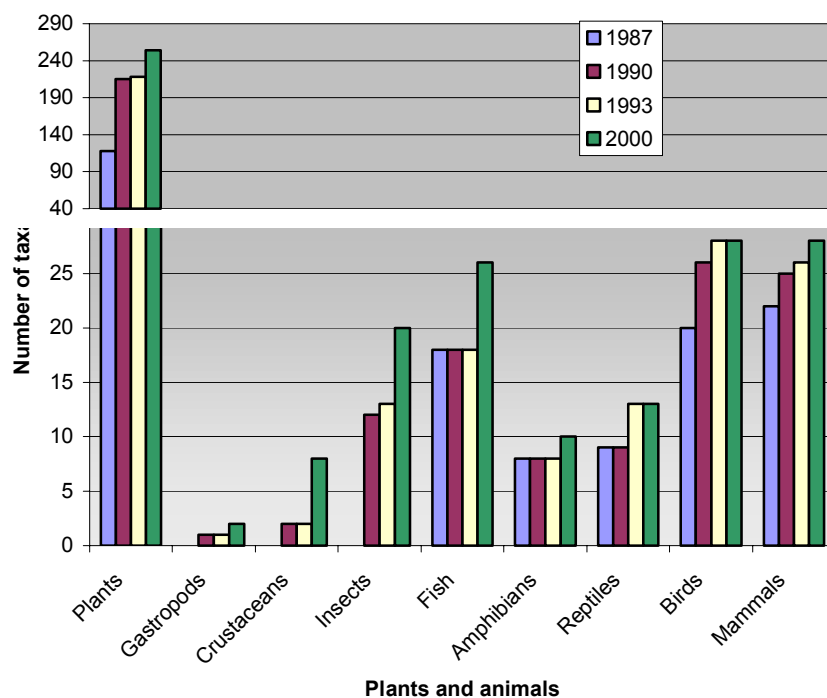Figure 1. Number of formally listed *taxa**, 1987 to 2000
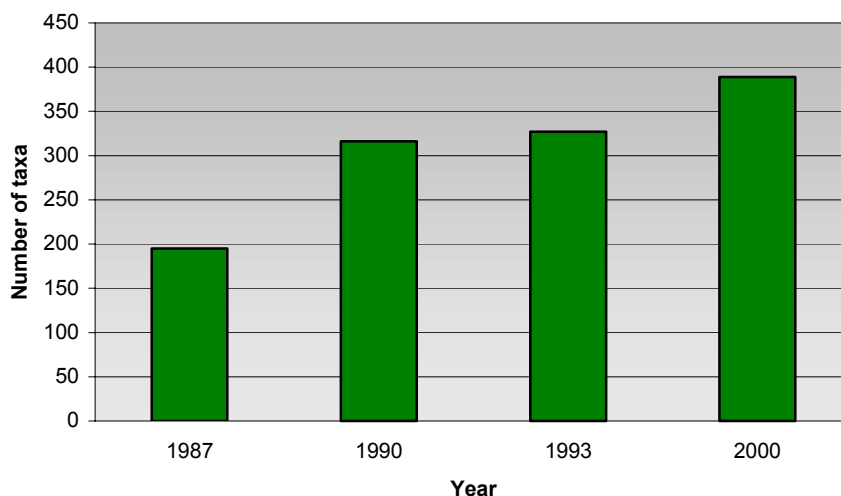
Official listed animal species refers to state listed as threatened or endangered (T&E), federally listed as T&E or on both the state and federal list as T&E. Official listed plant species refers to those that are state listed as threatened, endangered, or rare (TE&R), federally listed as T&E, or both state and federally listed as T&E.

**includes species, subspecies, distinct populations, evolutionary significant units (ESU)*

Source: DFG, 2001

Figure 2. Cumulative number of formally listed *taxa**, 1987 to 2000

Official listed animal species refers to state listed as threatened or endangered (T&E), federally listed as T&E or on both the state and federal list as T&E. Official listed plant species refers to those that are state listed as threatened, endangered, or rare (TE&R), federally listed as T&E, or both state and federally listed as T&E.

**includes species, subspecies, distinct populations, evolutionary significant units (ESU)*

Source: DFG, 2001

In addition to the official list of endangered, threatened, or rare plant species, the California Native Plant Society (CNPS) maintains a plant inventory that also provides a broad assessment of plant status in California. See CNPS rare plants inventory (CNPS, 2002). These plants include taxa recognized as species, subspecies, or varieties that fall into different categories that range from formal listing to a close association with a habitat type that is declining in California. A recent review of California's flora by CNPS concluded the following (DFG, 2002d):

- Twenty-nine plants are presumed extinct (CNPS List 1A plants);

- One thousand twenty-one are rare throughout their range, have declined significantly, or are judged vulnerable to changing environmental conditions (CNPS List 1B plants);

- Four hundred seventeen are rare in California but common beyond the State's borders (CNPS List 2 plants);

- Fifty-two represent problematic taxonomic questions and additional information is needed (CNPS List 3 plants); and

- Five hundred forty-four are of limited distribution or infrequently occur across a broader area but are considered uncommon (CNPS List 4 plants).

From 1984 to 2001, the number of California plants considered CNPS 1B has increased by 417 taxa (see Figure 3).

Figure 3. Number and percentage of total flora categorized as CNPS 1B plants (considered rare, showing significant declines or otherwise judged vulnerable in California), 1984-2001
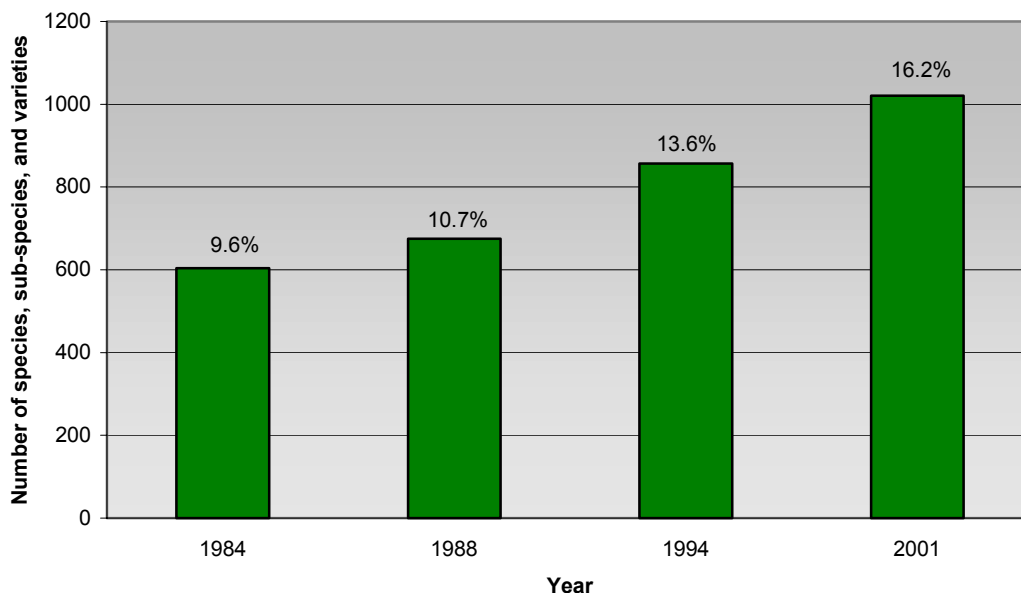
Source: California Native Plant Society, 2002

Findings on State listed taxa status

Species status refers to current condition as compared to the condition of the species at the time of State listing and an assessment of the species distribution, abundance, and

Population levels of 38 percent of the animal and 52 percent of the plants species listed as threatened, endangered or sensitive are in a state of decline.

population health (DFG, 2001). Table 2 is composed of taxa that are State listed or appear on both the State and federal lists. In general, 23 percent of formally State listed plants and animals are considered stable or increasing in number. However, of those taxa already listed, 38 percent of the animals and 52 percent of the plants are considered stable to declining or declining. This represents a broad indication of a general reduction in the health of California's ecosystems (see Table 2).

Table 2. Number and status of State listed animals and plants, 1997-1999 (percentage of total for row in parentheses)

	Increasing	Stable to increasing	Stable	Stable to declining	Declining	Extirpated	Unknown	N/A	Total
Plants subtotal	2 (1)	3 (1)	46 (21)	29 (13)	85 (39)	0	50 (23)	2 (1)	217
Invertebrates	0	0	1 (33)	0	1 (33)	0	1 (330	0	3
Fish	0	1 (6)	5 (28)	2 (11)	7 (39)	2 (11)	1 (6)	0	18
Amphibians	0	0	3 (38)	1 (13)	0	0	4 (50)	0	8
Reptiles	0	0	1 (13)	1 (13)	4 (50)	0	2 (25)	0	8
Birds	2 (9)	1 (5)	2 (9)	1 (5)	5 (23)	1 (5)	11 (50)	0	22
Mammals	0	1 (6)	0	2 (12)	6 (35)	0	8 (57)	0	17
Animal subtotal	2 (3)	3 (4)	12 (16)	7 (9)	23 (29)	3 (4)	27 (36)	0	79
Total plants and animals	4 (1)	6 (2)	58 (20)	36 (12)	107 (37)	3 (1)	79 (27)	2 (0.7)	293

Source: DFG, 2001

Findings on limitations of using a single species approach for maintenance of biodiversity

The degree of success achieved by resource managers and policy makers in the conservation of natural resource values rests to a large degree on how well scientific knowledge is incorporated in public policy. Application of policy or law, such as the ESA, that unintentionally emphasizes single species management as the primary or sole tool for ensuring the sustainability of ecosystem function is flawed biologically. In the early 1990s, Rohlf (1991) described several reasons why the protections afforded endangered species under current federal law fall short of the goal of conserving biological diversity. These included emphasis on high-profile species, lack of a standard that provides for a measure of population viability, lack of protection for distinct populations of species, inability to protect habitat to sustain recovered species, and discounting of randomly occurring environmental factors influencing population persistence.

*San Joaquin kit fox (*Vulpes macrotis*), federally endangered and threatened in California. Photo courtesy of California Living Museum.*

A second problem stems from the fact that the specific habitat requirements of these species, while they may overlap, are unique to each animal. It is therefore difficult or impossible to have any one species serve as an adequate surrogate or management indicator species for others when making management recommendations (Verner, 1984; Block et al., 1987; Patton, 1987; Landres et al., 1988). In addition, while decisions are still being made on individual species requirements on small parcels of habitat, the chances of them being effective, particularly for wide-ranging species, are considered by many to be tenuous. This occurs because there is little or no understanding of the cumulative effects of

these decisions. There is no mechanism to consider the relationship of a particular land use to how that particular use fits with the long-term viability requirements for the species (Smith, 1988).

Finally, the economic value of commodities associated with protection of some species has increasingly required resource managers to distinguish between what a wildlife species uses or prefers and the minimal requirements upon which it depends for survival. As the costs associated with resource production trade-offs increase so does the desire to precisely define species needs. Yet, no definition of dependency or methodology for its measurement has been offered (Ruggiero et al., 1988). Species habitat requirements or dependence is not a static relationship defined by a single habitat or habitat component. Spatial and temporal factors are also a part of an understanding of species habitat dependence. Information is required on the amounts, sizes, and arrangements required to ensure existence of the species' populations. The spatial configuration of habitat proves to be as important as the habitat itself relative to population maintenance (Ruggiero et al., 1988). The customary resource management approach of deciding what resource must be preserved and segregating it from the rest can have only limited results (Salwasser, 1991).

Findings on new approaches for managing listed species

A new approach to sustaining the diversity of biological resources has emerged. This is an ecosystem or landscape approach to conservation. It views land as a community of soils, water, and biota that must retain its compositional, structural, and functional integrity to sustain both its biological diversity and yields of desired resources (Salwasser, 1991). For the most part, this has meant more than placing additional land in reserves, such as parks. Ecosystems, at a scale required to maintain population viability, generally function within areas larger than existing parks and refuges. It is highly unlikely that significant additions to these protected land categories will be realized or even effective in sustaining resources.

*Diegan Coastal Sage Scrub, west of Temecula. Laurel sumac (*Malosma laurina*), California sagebrush (*Artemisia californica*), White sage (*Salvia apiana*). Photo courtesy of Sara Gerster, University of California, Riverside.*

Implementing a resource management approach that sustains biological diversity and alters the necessity of formally listing species will be dependent on how effective managers and policy makers are at recognizing and integrating the resource production potential of all lands of all ownerships. There are relatively few areas in California where land ownership is contiguous and large enough such that all aspects of resource production and species management fall within one jurisdiction.

The purpose of coordinating policies and actions between public agencies and private landowners is to increase the effective size and quality of the ecosystem to achieve those management goals. Coordinated strategies such as this can help to ensure that sufficient amounts and landscape patterns of different habitats are represented (Salwasser, 1991). The Natural Communities Conservation Planning program of DFG provides one example of a broad-based ecosystem approach to planning for the protection and perpetuation of biological diversity. Although the impetus behind the effort was land use

gridlock between the needs of a suite of species of concern and development interests, at least short-term success has been achieved in the coastal sage scrub plant community in southern California and similar efforts have been initiated in other parts of the State. See the online document Natural Communities Conservation Planning (DFG, 2002c).

Integrating existing conservation strategies that incorporate single species efforts as an element but emphasize a landscape approach that works to prevent the need to list species, will markedly improve the likelihood of conserving biological diversity values. Recent technological advances and modeling efforts now make it feasible to examine multiple overlays of geographic data. In addition, computer assisted databases such as the California Wildlife Habitat Relationship System make it possible to begin to examine a broad ranges of species and the effects of habitat change.

Glossary

biota: Having to do with living things. Something that is caused by, or produced by living things. Having to do with the biological aspects of an environment (as opposed to geological, etc. aspects).

California Wildlife Habitat Relationship: California Wildlife Habitat Relationship is a state-of-the-art classification system for California's wildlife. CWHR contains life history, management, and habitat relationships information on 675 species of amphibians, reptiles, birds, and mammals known to occur in the State. CWHR products are available for purchase by anyone interested in understanding, conserving, and managing California's wildlife.

CNPS: California Native Plant Society.

DFG: California Department of Fish and Game.

endangered species: Any species, including subspecies or qualifying distinct population segment, which is in danger of extinction throughout all or a significant portion of its range.

ESA: Endangered Species Act.

evolutionary significant unit: A population reproductively isolated from other population that represents an important component in the evolutionary history of a species.

formal list or **formally listed:** A State and federally regulatory list of animals and plants considered endangered, threatened, or rare pursuant to the Native Plant Protection Act of 1977, California Endangered Species Act of 1984, and/or federal Endangered Species Act of 1973.

population: A group of organisms of the same species occupying a particular space at a particular time.

rare: A plant species, subspecies, or variety that although not presently threatened with extinction, is in such small numbers throughout its range that it may become endangered if its present environment worsens.

species: Any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife, which interbreeds when mature.

subspecies: A collection of populations in a region with a high degree of genetic similarity and nearly complete demographic independence.

taxa (taxon): A taxonomic group of any rank (e.g. a given species, subspecies, variety) that is sufficiently distinct to be worthy of being assigned to a definite category.

threatened species: Any species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

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